NATIONAL WATER LEVEL PROGRAM SUPPORT TOWARDS BUILDING A SUSTAINED OCEAN OBSERVING SYSTEM FOR CLIMATE

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PROJECT SUMMARY

The purpose of this document is to provide a progress report on a continuing program plan for sea level observations that is being implemented by the NOS Center for Operation Oceanographic Products and Services (CO-OPS) in support of the NOAA Climate Program Office Global Ocean Observing System for Climate. Two tasks have been identified for which the NOAA National Ocean Service (NOS) Center for Operational Oceanographic Products and Services (CO-OPS) is providing support:

1) upgrade the operation of selected National Water Level Observation Network Stations to ensure continuous operation and connection to geodetic reference frames.

2) operate and maintain water level measurement systems on Platform Harvest in support of calibration of the TOPEX/Poseidon and Jason 1 satellite altimeter missions.

An ancillary task, to develop and implement a routine annual sea level analysis reporting capability that meets the requirements of the Climate Observation Program, is described elsewhere in this report.

The fundamental URL's are:

http://tidesandcurrents.noaa.gov for access to all programs, raw and verified data products, standards and procedures, and data analysis reports and special reports.

http://opendap.co-ops.nos.noaa.gov/content/ for access to data through a new IOOS web portal.

http://tidesandcurrents.noaa.gov/sltrends/sltrends.shtml for access to the latest NWLON sea level trends and monthly mean sea level anomalies.

http://tidesandcurrents.noaa.gov/sltrends/sltrends_global.shtml for access to the latest sea level trends and monthly mean sea level anomalies for a set of global sea level reference stations

The Climate Operating Monitoring Principles used by the Climate Program Office are very much the same as used for the NOAA National Water Level Program (NWLP) for which the National Water Level Observation Network (NWLON) is a long-term continuous operational oceanographic network that's strives to meet NOAA's mission needs for tides and water levels. The NWLP is an end-to-end program that is planned, managed, and operated to provide products that meet user-driven needs. The program also consists of technology development, continuous

quality control, data base management, and operational readiness and fully open web-site for data delivery. These data and related sea level products are made available over the web-site for use by PSMSL, UHSLC, and the WOCE communities.

1) Task One – Upgrade Ocean Island Station Operations

There are several coastal and island NWLON stations critical to the Global Ocean Observing System for Climate. The operation and maintenance of the ocean island stations of the National Water Level Observation Network (NWLON) has been increasingly more difficult over time due to the slow abandonment of the island facilities at which the stations reside. Finding routine flights and flights which are cost effective are becoming increasingly difficult, yet these stations require high standards of annual maintenance to ensure the integrity of their long term data sets. Annual maintenance is even more important, in light of the fact that corrective maintenance is logistically very difficult and expensive. For example, the NWLON station at Johnson Island was recently de-commissioned because of the stoppage of routine access to the island.

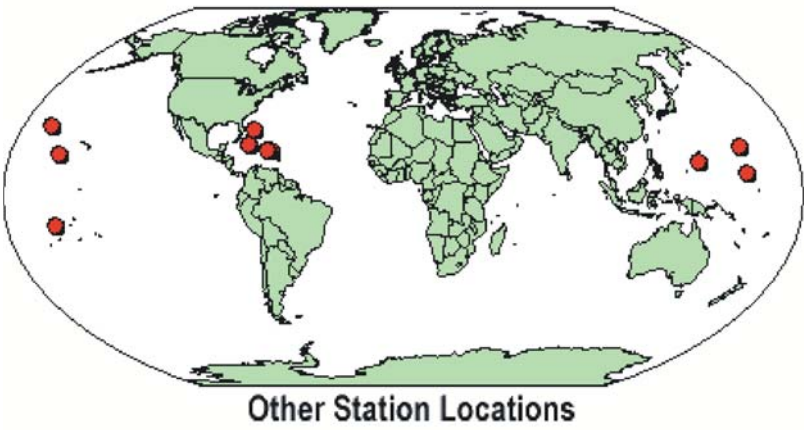

Figure 1. Ocean Island NWLON Station Map

Although operation of all of the long term NWLON and GLOSS stations is important, it is proposed that NOAA NWLON Ocean Island stations begin to be upgraded first with this funding to ensure their continuous operation (program funding and budget initiatives will be used for operation of the coastal stations). These targeted funds will be used for travel costs and for upgrade to backup systems. The upgrades will include high accuracy acoustic or paroscientifc pressure sensors and redundant Data Collection Platforms (DCP's) with equal capability to the existing primary systems. The station operations will also be enhanced with GPS connections to geodetic systems followed by installation of CORS at selected sites. The following is a list of the ocean island NWLON stations (not including Hawaii) that have been considered in this category as priority for upgrade.

Station:	CORS Operating
Guam	Yes
Kwajalein	Yes
Pago Pago	Yes

Wake	No
Midway	No
Adak	No
Bermuda	Yes
San Juan. PR	Yes
Magueyes Island, PR	No
Charlotte Amalie, VI	No
St Croix, VI	Yes

2) Task Two - Satellite Altimeter Mission Support

Support for the TOPEX/Poseidon satellite altimeter mission began with installation of an acoustic system and a digibub system on Platform Harvest in 1983 (see figure 2). System operations include provision of water level measurements relative to the satellite altimeter closure analysis reference frame for calibration monitoring (see B. Hanes et al, Special Issue of Marine Geodesy, 2003 “The Harvest Experiment: Monitoring Jason-1 and TOPEX-Poseidon from a California Offshore Platform”.

Figure 2. Platform Harvest Calibration Site at which NOAA tide gauges are located.

CO-OPS special support has included a vertical survey on the Platform necessary to relate the water level sensor reference zeros (near the bottom catwalk) to the GPS reference zero (located up top at the helipad on the Platform. Continuous data are required to monitor effects of waves on the water level measurements and to ensure provision of data during the times of altimeter overflights every ten days. The original acoustic system was replaced by a digibub pressure system prior to the Jason-1 altimeter launch.

The two digibub pressure tide gauge systems are collecting continuous water level data streams surveyed into the Platform and Satellite Orbit Reference frames. Funding is used cover travel and routine an emergency maintenance and water level and ancillary sensor calibrations. Raw and verified 6-minute interval water level data are posted on the CO-OPS web-site.

FY2006 Progress

Task One:

Maintenance and upgrade of the ocean island NWLON stations continued. Redundant stations were installed at Wake and Pago Pago in FY 2006. The redundancy included the installation of additional DCP's and sensors at nearby, but independent, locations from the existing primary locations.

Figure 3. The NOAA tide station at Wake Island, which now includes redundant equipment

Task Two:

Operation and maintenance of the Platform Harvest station continued the past year. Coordination of activities continues with JPL. One of the pressure systems requires repair to bring it back online, however continuous data have been maintained. JPL is arranging for underwater maintenance of the bubbler pressure system orifices. JPL continues to provide reports on the status of the verification project at Platform Harvest.

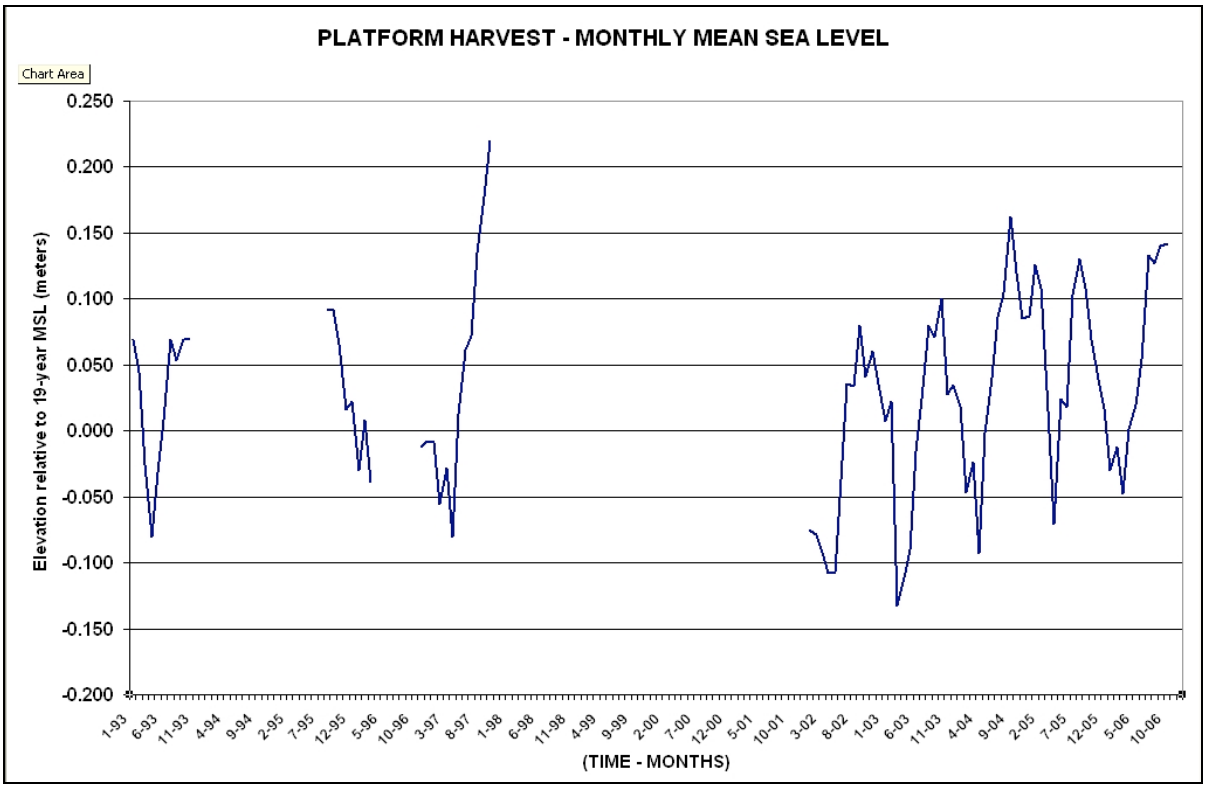

Figure 4. Platform Harvest Calibration Site – Observed Monthly MSL from the Tide Station

3) Publications and Reports

Results, analyses, and data products are routinely updated and reported on via the CO-OPS web site at: http://tidesandcurrents.noaa.gov/sltrends/sltrends.html